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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/665,417	09/22/2003	Robert J. Small	60937-0215-US	6517

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MORGAN LEWIS & BOCKIUS LLP
1111 PENNSYLVANIA AVENUE NW
WASHINGTON, DC 20004

EXAMINER

MARCHESCHI, MICHAEL A

ART UNIT	PAPER NUMBER
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1755

DATE MAILED: 08/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/665,417

Applicant(s)

SMALL ET AL.

Examiner

Michael A Marcheschi

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 37 and 42-67 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 37 and 42-67 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4/13/04.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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The disclosure is objected to because of the following informalities:

The specification is objected to because it fails to contain the updated information for the continuing data as required (patent number).

Appropriate correction is required.

Claims 37 and 42-67 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 37 is indefinite because the phrase “the barrier/adhesion layer of Ta/TaN” lacks antecedent basis since a “barrier/adhesion layer of Ta/TaN” has not been **literally** defined before. In addition, in this phrase, the claim states that the barrier layer is specifically “Ta/Tan” but before this limitation in the claim, it is stated that the barrier layer is Ta, TaN or both. In view of this, the examiner is unclear as to the scope of the barrier layer, thus rendering the scope of the claim unclear.

Claim 37 is also indefinite as to the phrase “composition is acidic said composition provided” because this phrase does not make sense, thus rendering the scope of the claim unclear.

Claim 37 is also indefinite as to the phrase “said barrier/adhesion layer (both occurrences in step (c)) because a “barrier/adhesion layer” has not been **literally** defined before (see first indefinite rejection of claim 37).

Claim 37 is also indefinite as to the phrase “said planarizing selectively planarizing the barrier layer” because this phrase appears to be incomplete and is not clearly defined. Should this be “**wherein the planarizing step selectively planarizes the barrier layer**”.

Claim 44 is indefinite because nitric acid is not a nitrate.

Claim 50 is indefinite because the phrase “said barrier/adhesion layer” lacks antecedent basis since a “barrier/adhesion layer” has not been **literally** defined before (both occurrences in step (c))

Claim 50 is also indefinite as to the phrase “said planarizing selectively planarizing the barrier layer” because this phrase appears to be incomplete and is not clearly defined. Should this be “**wherein the planarizing step selectively planarizes the barrier layer**”.

Claim 53 is indefinite because nitric acid is not a nitrate.

Claim 60 is indefinite because the phrase “the barrier/adhesion layer of Ta/TaN” lacks antecedent basis since a “barrier/adhesion layer of Ta/TaN” has not been **literally** defined before. In addition, in this phrase, the claim states that the barrier layer is specifically “Ta/TaN” but before this limitation in the claim, it is stated that the barrier layer is Ta, TaN or both. In view of this, the examiner is unclear as to the scope of the barrier layer, thus rendering the scope of the claim unclear.

Claim 60 is also indefinite as to the phrase “said barrier/adhesion layer (both occurrences in step (c)) because a “barrier/adhesion layer” has not been **literally** defined before (see first indefinite rejection of claim 60).

The other claims are indefinite because they depend on indefinite claims.

Claims 37, 42-49, 56 and 60-67 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The new matter added to claim 37 is the limitation “to planarize copper to about the level of the barrier” because the specification never literally defined this. Sections [0011] and [0014] state that the phase one slurry planarizes the copper and stops once the barrier layer is reached. This does **not** provide reasonable support for “to about the level of the barrier”. The specification defines a **definite** point at which the first CMP step stops but the phrase in question **does not** define a definite point (“to about the level” does not define a definite point).

The limitation of claim 47 is new matter because the specification never literally defined this. Section [0020] states that the pH is for the **hydroxylamine nitrate** used in the composition (and **not** the entire composition, as claimed). This does **not** provide reasonable support for the subject matter, as claimed.

The limitation of claim 56 is new matter because the specification never literally defined this. Section [0035] states that the pH is for the **oxidizer, which includes hydrazine** and DI water (other components are also present in the oxidizer composition), used in the composition (and **not** the entire composition, as claimed). This does **not** provide reasonable support for the subject matter, as claimed.

The new matter added to claim 60 is the limitation “to planarize copper to about the level of the barrier” because the specification never literally defined this. Sections [0011] and

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[0014] state that the phase one slurry planarizes the copper and stops once the barrier layer is reached. This does **not** provide reasonable support for “to about the level of the barrier”. The specification defines a **definite** point at which the first CMP step stops but the phrase in question **does not** define a definite point (“to about the level” does not define a definite point).

The limitation of claim 65 is new matter because the specification never literally defined this. Sections [0030] and [0032] states that the pH is for the **oxidizer, which includes the claimed nitrate** and DI water (other components are also present in the oxidizer composition, as in the case of ammonium nitrate), used in the composition (and **not** the entire composition, as claimed). This does **not** provide reasonable support for the subject matter, as claimed.

The other claims are rejected because they depend on rejected claims.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

In all of the below rejections, although the references might not add the materials as aqueous solutions, no distinction is seen to exist because it is the examiners position that when the composition of the materials is combined with water, the claimed aqueous solution of said materials will be apparent.

Claims 60, 61, 63 and 65 are rejected under 35 U.S.C. 102(a or e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over either (1) Imai et al. or (2) Mandigo et al. (436).

Imai et al. teach in the abstract, column 2, lines 55-68, column 12, lines 57-57, column 13, lines 30-35, column 14, line 59-column 17, line 10 and figure 13, method of planarizing a substrate comprising a copper containing structure, a dielectric and a barrier layer (claimed material), said method comprising initially planarizing the copper with a first composition (phase one slurry), followed by planarizing the barrier layer with a second CMP composition comprising water, ammonium nitrate, benzotriazole and silica abrasive. The composition has a pH as defined in figure 13 and column 14, line 59-column 15, line 13.

Mandigo et al. teach in the abstract, column 2, line 57-column 4, line 68 and column 9, line 35-column 10, line 19, a method of planarizing a substrate comprising a copper containing structure, a dielectric and a barrier layer (claimed material), said method comprising initially planarizing the copper with a first composition (phase one slurry), followed by planarizing the barrier layer with a second CMP composition comprising water, ammonium nitrate, benzotriazole and silica abrasive. The pH of the composition is also defined.

The claimed invention is anticipated by the references because the references teach planarizing methods which comprises the claimed steps and use planarizing compositions which comprises all of the claimed components. In the alternative, no patentable distinction is seen to exist between the references and the claimed invention in the absence of any evidence showing the contrary.

Claims 66-67 are rejected under 35 U.S.C. 103(a) as obvious over either (1) Imai et al. or (2) Mandigo et al. (436).

The references teach compositions comprising silica and although these references do not teach the use of colloidal silica, it is the examiners position that any conventional silica polishing abrasive would have been obvious (the references imply that any conventional abrasive can be used) and since colloidal silica is a conventional polishing abrasive, one skilled in the art would have found it obvious to use colloidal silica as the abrasive in the compositions according to these references. In addition, the substitution of one abrasive for another that is used for the same purpose (polishing) is well within the level of ordinary skill in the art. In addition, the references teach silica, in general, and this encompasses colloidal silica because **“A generic disclosure renders a claimed species prima facie obvious. *Ex parte George* 21 USPQ 2d 1057, 1060 (BPAI 1991); *In re Woodruff* 16 USPQ 2d 1934; *Merk & Co. v. Biocraft Lab. Inc.* 10 USPQ 2d 1843 (Fed. Cir. 1983); *In re Susi* 169 USPQ 423 (CCPA 1971)”**. With respect to the size of colloidal silica (being obvious), colloidal silica generally has a size within the claimed range and therefore this limitation is obvious.

Claims 62 and 64 are rejected under 35 U.S.C. 103(a) as obvious over either (1) Imai et al. or (2) Mandigo et al. (436) **both** in view of Uchikura et al.

Uchikura et al. teach in the abstract and sections [0050]-[0053] and [0102] that aluminum salts, such as nitrates (aluminum nitrate), are known oxidizers for semiconductor planarization slurries.

Imai teach that, in an alternative to ammonium nitrate, the composition can contain **other** oxidizers. Mandigo et al. uses the phrase "such as" to define the oxidizers. In view of the above, it is the examiners position that the teachings of the references are limited to the specific oxidizers set forth and that others can be used. In view of this, it is the examiners position that any conventional oxidizer would have been obvious (the references imply that any conventional oxidizer can be used) and since aluminum nitrate is a conventional polishing oxidizer, one skilled in the art would have found it obvious to use aluminum nitrate as the oxidizer in the compositions according to these references. In addition, the substitution of one oxidizer for another that is used for the same purpose (polishing) is well within the level of ordinary skill in the art.

Claims 60, 61, 63 and 65-66 are rejected under 35 U.S.C. 102(a or e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Easter et al.

Easter et al. teaches in the abstract, column 1, lines 27-52, column 3, line 42-column 4, line 10 and column 5, lines 44-column 7, line 30, a method of planarizing a substrate comprising a copper containing structure, a dielectric and a barrier layer (claimed material), said method comprising initially planarizing the copper with a first composition (phase one slurry), followed

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by planarizing the barrier layer with a second CMP composition comprising water, ammonium nitrate, benzotriazole and colloidal silica. The Ph of the composition is also defined.

The claimed invention is anticipated by the reference because the reference teaches a planarizing method which comprises the claimed steps and uses a planarizing composition which comprises all of the claimed components. In the alternative, no patentable distinction is seen to exist between the reference and the claimed invention in the absence of any evidence showing the contrary.

Claims 62 and 64 are rejected under 35 U.S.C. 103(a) as obvious over Easter et al. in view of Uchikura et al.

Easter et al. specifically teaches that **any** known oxidizer can be used. In view of the above, it is the examiners position that the teachings of the references are limited to the specific oxidizers set forth and that others can be used. In view of this, it is the examiners position that any conventional oxidizer would have been obvious (the reference specifically teaches that any conventional oxidizer can be used) and since aluminum nitrate is a conventional polishing oxidizer, one skilled in the art would have found it obvious to use aluminum nitrate as the oxidizer in the composition according to this reference. In addition, the substitution of one oxidizer for another that is used for the same purpose (polishing) is well within the level of ordinary skill in the art.

Claim 67 is rejected under 35 U.S.C. 103(a) as obvious over Easter et al.

The reference teaches a composition comprising colloidal silica and although this reference does not teach the size of the colloidal silica, it is the examiners position that colloidal silica generally has a size within the claimed range and therefore this limitation is obvious.

In view of the teachings as set forth above, it is the examiners position that the references reasonably teach or suggest the limitations of the rejected claims.

"about" **permits some tolerance**, *In re Ayers*, 154 F 2d 182, 69 USPQ 109.

"A reference is good not only for what it teaches but also for what one of ordinary skill might reasonably infer from the teachings. *In re Opprecht* 12 USPQ 2d 1235, 1236 (CAFC 1989); *In re Bode* USPQ 12; *In re Lamberti* 192 USPQ 278; *In re Bozek* 163 USPQ 545, 549 (CCPA 1969); *In re Van Mater* 144 USPQ 421; *In re Jacoby* 135 USPQ 317; *In re LeGrice* 133 USPQ 365; *In re Preda* 159 USPQ 342 (CCPA 1968)". In addition, "A reference can be used for all it realistically teaches and is not limited to the disclosure in its preferred embodiments" See *In re Van Marter*, 144 USPQ 421.

The subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have selected the overlapping portion of the range disclosed by the reference because overlapping ranges have been held to be a prima facie case of obviousness, see *In re Malagari*, 182 U.S.P.Q. 549; *In re Wertheim* 191 USPQ 90 (CCPA 1976)".

Evidence of unexpected results must be clear and convincing. *In re Lohr* 137 USPQ 548. Evidence of unexpected results must be commensurate in scope with the subject matter claimed. *In re Linder* 173 USPQ 356.

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The additional references cited on the 1449 have been reviewed by the examiner and are considered to be art of interest since they are cumulative to or less than the art relied upon in the above rejections.

Any foreign language documents submitted by applicant has been considered to the extent of the short explanation of significance, English abstract or English equivalent, if appropriate.

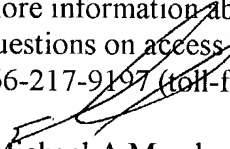
The claims not rejected on art would be allowable if amended to overcome the new matter and/or indefinite rejections defined above because said art fails to teach or suggest the claimed method with respect to the specific steps and specific compositions used to planarize the claimed substrate. Specifically, the limitations “wherein the substrate has been polished with a phase one slurry to planarize copper” in combination with the planarizing composition used in the planarizing steps defined in parts (b) and (c) of the independent claims are not taught or suggested.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael A Marcheschi whose telephone number is (571) 272-1374. The examiner can normally be reached on M-F (8:00-5:30) First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark L Bell can be reached on (571) 272-1362. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MM
8/04


Michael A Marcheschi
Primary Examiner
Art Unit 1755